

PEST TECHNOLOGY

Pest Control and Pesticides

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MAYfair 4265

AT THIS TIME OF THE YEAR many organisations review the old year and, in the light of lessons learned, make plans for the new. Surely the lesson learned this year is that there is an urgent need to educate the public as to the true value of agricultural chemicals. There has been, particularly in the last few months, a number of unfavourable comments on the chemicals used in agriculture. These alarms, which have appeared in the popular and scientific press and which have been discussed rather more constructively in parliament, in many cases have obviously been raised by individuals or organisations who have not considered the situation as a whole. They have either not been in possession of the true facts or, for some reason known only to themselves, "conveniently" chosen to ignore the evidence for the continued use of chemicals in agriculture. Evidence which, viewed impartially, shows that the benefits bestowed to mankind through the use of these chemicals far outweighs the disadvantages that they have.

Manufacturers of agricultural chemicals are well aware of the toxic properties of their products and they do their utmost to ensure that the users are also aware of them. By continued and careful research they are progressively reducing the number of dangerous pesticides. Unfortunately the popular press and regrettably some sections of the scientific press fail to mention the precautions taken by British Manufacturers of Agricultural Chemicals or their voluntary co-operation with the M.A.F.F., the N.F.U. and other responsible organisations, possibly because such items would not make "good news" as compared with a sensational, serious accident.

According to one daily newspaper an editorial appearing in the Medical Press linked leukaemia not only with radio-active fall-out but also with agricultural chemicals. Has the medical gentleman concerned any evidence to support this belief? Has he done any research work on the problem? Is he not aware that some of the self-same chemicals he condemns have been and continue to be, of inestimable value to world health by their use in the control of, and, in many areas, the total elimination of, important vector borne diseases such as malaria? Perhaps the medical gentleman was misquoted but this is doubtful; whatever the case such a statement taken seriously could cause a devastating setback to plans for the elimination of many diseases of world-wide importance. Doctors are eminent and respectable members of the community whose opinions are taken seriously and they should not utter such statements without qualifying them or allow unqualified statements to be sensationalised in the National press.

The fact that "several farmworkers have lost their lives whilst handling these toxic chemicals" was referred to but the exact number was not given nor was there any comparison with other causes of death amongst agricultural workers. It is not so long ago that J.M. Barnes, M.B., B.Chir., in an article "Occupational Hazards arising from the use of Toxic Substances in Agriculture" published in "The Practitioner" said:—

"At the outset it is important to put the problem in its proper perspective. The number of deaths and hours lost from work arising from 'poisonous' substances amounts to less than 1% of the total among agricultural workers."

Although the use of chemicals in agriculture is increasing it has not done so to the extent that the above estimate, made only a little more than a year ago, has been drastically altered.

In view of the recent outburst of misinformed publicity we would like to quote from our leader of February, 1959:—

"We offer a plea for a public relations' to counter any possible wrong impression which may be gained by the public: all-possible wrong impression which may be gained by the public: allegations by individuals or bodies of people, elected representatives or the like, which are felt to be untrue, should be countered in the press by an adequate, all-embracing service of public relations. In this way the industry is safeguarding and insuring itself against any possible misinformed public opinion."

We believe that this plea is still worthy of consideration.

NEW YEAR MESSAGE

from GEORGE HUCKLE

Chairman of Association of British Manufacturers of Agricultural Chemicals

IN THE NEW YEAR MESSAGE which you invited me to contribute last year, I stressed the further progress we had witnessed in the use of chemicals on the land. Looking back on 1959 I think the same is true and I think we could add that the new generation of farmers springing up show an increased understanding of the technical advances which are being made in the agricultural industry.

However, I think we would be unrealistic as an Association if we did not face up to some of the adverse publicity which farm chemicals have received during the past year. The farming community and the manufacturers may take the view that emotional opposition to the use of chemicals is both ignorant and ill-informed. To a large extent this is true. Nevertheless, I believe that the industry as a whole must be fully aware of some of the popularly held misconceptions and furthermore must be prepared to do all it can to overcome them. We have gone a long way in providing advice and service to the farmer on the safe use of chemicals of all descriptions. There is a need now to tackle the much wider and in some ways much more difficult job of explaining to the public at large the benefits which the farmer and the community can and do derive from these technical advances in farming methods.

I may say that our efforts will of course not be confined to increasing the understanding of the public about the application of our products. Our efforts in the research field will also be vigorously pursued and our aim is always to produce new and safer chemicals and the problem of toxicity is one which is in the forefront of the minds of those engaged on research.

On the credit side I would like to emphasise once more what very satisfactory relations we maintain with the Ministry of Agriculture.

Finally, I would like to say on behalf of the Association how much we value the co-operation and assistance provided by your journal and to extend our good wishes to you for the coming year.

NEW YEAR MESSAGE

from D. J. S. HARTT

President, Industrial Pest Control Association

THE INDUSTRIAL PEST CONTROL ASSOCIATION again welcomes the opportunity to send Greetings to the readers of *Pest Technology* and to wish the editorial and technical staff of the journal good fortune in their efforts to maintain its continued production in its second year to a standard which will ensure an ever widening circle of readers.

To attempt to cover the whole field of interest implied in the title *Pest Technology* is an ambitious project, embracing as it does all aspects of the development and use of pesticides for crop protection, the province of interest of our sister Association, the Association of British Manufacturers of Agricultural Chemicals, and equally well, the development and use of pesticides in Industrial Pest Control with which the members of this Association are concerned.

Industrial pest control embraces the control of insect and pest infestation of stored products coming to us from overseas, of the end products of our own great farming industry and the control of insect and rodent pests in ships, all other forms of transport, in dock premises, industrial, commercial and domestic buildings.

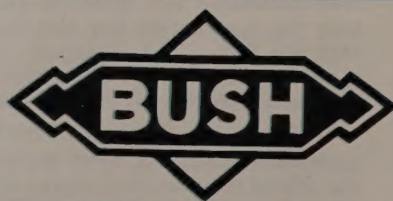
Industrial pest control is vital also to the food production, processing and distribution industries at every stage where in fact pests breed and multiply if allowed to do so, to plague us and our food supplies.

At this time of the year it is sensible to review the past year's activities as well as to plan ahead. The Industrial Pest Control Association has continued its close liaison with Government Departments and Research Organisations and has established closer relations with the Association of British Manufacturers of Agricultural Chemicals on matters affecting the interests of the crop protection and industrial pest control industries. In the past year the Association has also taken an active part in discussions with the Pesticide Associations of many European countries, and is to become in 1960 a member of the European Federation of National Associations of Pesticide Manufacturers.

The principal objects of the Federation will be first to ensure permanent contact between the national producers associations and the official international organisations and to centralise joint studies of the pesticide problems arising on national and international planes on economic, legal and technical questions of common interest, with a view to seeking common standpoints which are most favourable for the whole of the pesticide industry.

In view of the formation of the Outer Seven Free Trade Area, which brings with it the possibility of wider understanding with the Common Market group, this step is of considerable importance particularly for members of the Association seriously interested in European export markets.

On behalf of the members of the Association, I send Greetings and Good Wishes for 1960 to all concerned with the promotion of home and overseas pesticides business.



BPS 50

A new Pyrethrum Synergist

PRACTICAL CONTROL OF THE WAREHOUSE MOTH

Ephestia elutella (Hb)

Using Pyrethrum Spray

By A. A. GREEN and JOYCE KANE (*Pest Infestation Laboratory, Agricultural Research Council*).

SUMMARY

A LARGE-SCALE TRIAL is described in which clean cocoa stored in a stowage heavily infested by the Warehouse moth, *Ephestia elutella* (Hb.), was given complete protection from insect infestation by the application of an insecticide containing 0.3% pyrethrins and 3.0% piperonyl butoxide to the outside of the stacks. The spray was applied monthly at the rate of 1 gal. per 5,000 sq. ft.

The estimated cost of labour and insecticide for the protection of 5,000 bags of cocoa, valued at the time of the experiment at approximately £100,000, was about £30 for the 5-month period of moth activity.

Introduction

The value of insecticidal films to protect goods in warehouses from infestation by moths was first demonstrated by Potter.¹ He showed that fumigated dried fruits in wooden cases could be protected from infestation by *Ephestia elutella* (Hb.) and *Plodia interpunctella* (Hb.) by regularly spraying with 0.8% pyrethrins in a technical white oil. He also achieved some success in the protection of cocoa and tobacco but recorded that no accurate assessment had been possible because the goods were infested on arrival at store and fresh infestations were continuously brought into the warehouse. Since then, the method, variously modified, has been in common use and has formed the basis of the recommendations made by the Ministry of Agriculture, Fisheries and Food (M.A.F.F.),² that stacks should be sprayed at intervals of 3 to 4 weeks from early May until late October with 1.3% pyrethrins (or the pyrethrins/piperonyl butoxide equivalent) in a technical white oil at the rate of 1 gal. per 2,500 sq. ft. Davies³ recommends weekly spraying with 0.6% pyrethrins at the rate of 1 gal. per 2,500 sq. ft. for control of moths, including *E. elutella*, in bakeries.

Although higher concentrations of insecticide have been employed than those used by Potter,¹ only limited success has been achieved in many cocoa warehouses and heavy infestations by *E. elutella* have been relatively

common. Since 1953, therefore, part of the programme of research of the Pest Infestation Laboratory has been concerned with the protection of bagged cocoa from infestation by *E. elutella*. A series of field experiments showed that excellent control could be achieved, more economically than had previously been supposed, by the regular use of lindane smoke generators (Green⁴) or by spraying the stacks monthly with relatively small doses of pyrethrum in a technical white oil (Pest Infestation Research^{5,6,7}). From this work the Laboratory formulated its recommendations for the protection of bagged cocoa and modifications were made by the M.A.F.F. to their recommendations.

It was not practicable to carry out these initial trials on large consignments of cocoa because of the risk of exposing a valuable commodity to insect infestation. In any event, cocoa does not normally remain in store for the 9-12 months necessary to complete experimental observations. Stowages were used, therefore, having heavy endemic infestations of the Warehouse moth but, as far as possible, containing only non-infestible material during the period of experimental treatment. Assessments of the treatments were made by the "trap bag" technique (Green⁴) which involved exposing to treatment and infestation, sacklets of cocoa which could be removed for laboratory examination.

In 1958, however, a firm of chocolate manufacturers gave facilities for a full-scale practical trial of the Laboratory's standard recommendations for the spraying of bagged cocoa to give protection from infestation by *E. elutella*.

History of infestations

In the experience of the chocolate firm, Nigerian cocoa which had been fumigated in barges and then stored for up to 6 months in superficially clean, London warehouses was commonly found to be heavily infested with larvae on arrival at the factory. Although incomplete control by fumigation had been suspected, a case investigated as

a preliminary to this trial showed that the infestation was by *E. elutella* which does not occur in Nigeria but is endemic in many London warehouses. Furthermore, an inspection during the winter of cracks and crannies in many stowages "cleaned" ready for the storage of new season's cocoa, showed most of the stowages to be infested with hibernating larvae to such an extent as to threaten heavy infestations of cocoa stored during the following summer.

It seemed likely, therefore, that infestation of the cocoa was occurring during storage in these warehouses, although the warehouse staff were reported to be carrying out protective spraying on similar lines to those recommended by the Laboratory. It appeared, therefore, that either the recommended method was not effective in practice or it was not being applied satisfactorily. Consequently, a practical trial was planned of the Laboratory's recommendation that "Bagged cocoa should be sprayed monthly with a mixture of 0.3% pyrethrins and 3.0% piperonyl butoxide in a technical white oil at the rate of 1 gal. per 5,000 sq. ft. The spray should be applied from a distance of 3 to 10 ft. by means of a spraying apparatus with a throw of at least 10 ft."

The pyrethrum/piperonyl butoxide mixture was used because the experiment was a confirmatory trial of

earlier work using this insecticide before Brooke,⁸ showed the synergistic effect of piperonyl butoxide on pyrethrins to be relatively low against *E. elutella*. He did find, however, that synergism was greatest when the insecticide was applied as a film against adults and Lloyd and Hewlett⁹ have demonstrated that the adults are very susceptible to films of the mixture. For practical purposes, both 1.3% pyrethrins and the mixture of 0.3% pyrethrins with 3.0% piperonyl butoxide are so highly toxic to *E. elutella* moths that small differences in their effectiveness are likely to be of no significance.

Experimental procedure

Experimental site

Only one stowage was available which met the following requirements of the trial:-

- (1) The fabric of the stowage should be infested with hibernating larvae of *E. elutella*.
- (2) The stowage should contain no infestible material other than the test cocoa for the entire experimental period.
- (3) The stowage should be sufficiently isolated that experimental work could proceed without disrupting the normal work in the warehouse.

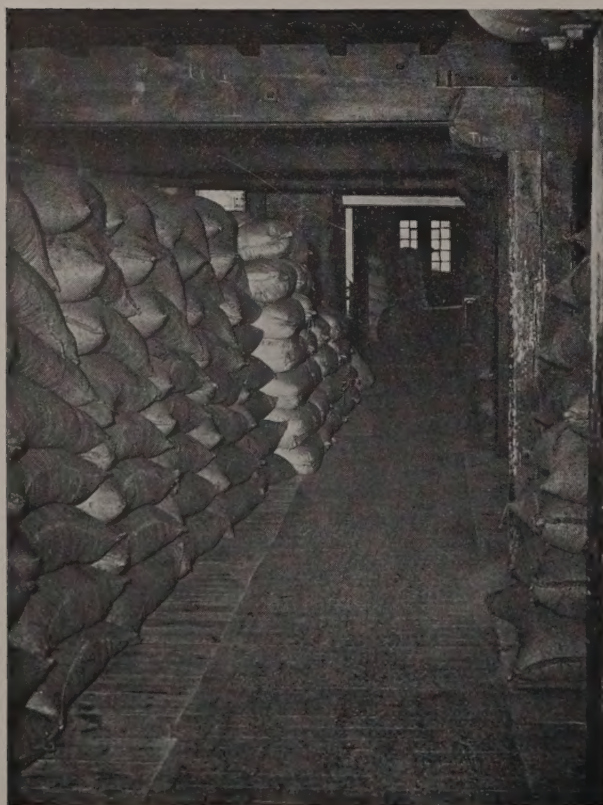
The selected stowage was a cellar of about 57,000 cu. ft., containing about 3,000 bags (187 tons) of newly fumigated cocoa together with some bagged coffee and turmeric making a total of about 5,000 bags with 11,000 sq. ft. of exposed bag surface. On our instructions, the cocoa had been stacked at least 9 in. from the walls.

For the purpose of the experiment and for costing estimates, the entire 5,000 bags were treated as if they contained infestible material, although counts and observations were, of course, restricted to the cocoa stacks.

About 1,100 bags of the same consignment of fumigated cocoa which was stored in an adjoining stowage of roughly similar construction was left for routine treatment by the wharfinger and served as a control. This stowage had only a very light endemic infestation compared with the treated site. Various small parcels of cocoa in four other stowages treated by the wharfinger were also kept under observation for the purpose of comparison.

Spraying method

A protective film of insecticide was applied, at monthly intervals from May to September inclusive, to the outside of the stacks by means of a portable electric sprayer. Where possible the spray was directed at the surface from a distance of about 3 ft. but some parts of the top and back of the stacks were sprayed from distances of up to 10 ft. The machine was the same type as that used by the wharfinger. The application was no more thorough than might reasonably be expected of a correctly instructed, conscientious operator.



Bagged goods in a typical warehouse stowage.

Assessment of results

Counts were made at fortnightly intervals of the numbers of living moths on the ceilings and affected and dead moths on the floors in the treated and control stowages and, whenever possible, in the other stowages under observation.

During October and November comparisons were made of the numbers of larvae migrating from cocoa in the various stowages. It could reasonably have been assumed that the only cocoa infested with *E. elutella* was that from which migration of larvae occurred. However, since there was a possibility that some larvae had remained in the cocoa, 40 bags of cocoa from the outside and inside of the experimental stacks and 20 bags from the outside of the control stacks were taken to the Laboratory, sieved, and examined for insect infestation. This also gave opportunity for observations to be made on other insects infesting the cocoa.

Results

Moth populations

Moths were present in the experimental stowage from June to August inclusive and in all other stowages from June to September inclusive. Counts of living and dead moths showed that the highest emergence was in the experimental stowage; during the period of peak population there were nearly ten times as many moths in the experimental stowage as in the control. The treatment, however, reduced the number of living moths to a much lower level than in any other stowage (Table I). About 30% of the moths killed were newly emerged and had not expanded their wings.

Counts in the experimental stowage were cumulative until some unauthorized floor sweeping occurred between 6th and 20th August, 1958. Frequent movement of commodities occurred in other stowages so that accurate counts were possible only for living moths. However, these counts, together with those made on dead moths, gave a good general indication of the degree of effectiveness of the wharfinger's treatment.

Larval migration

Larvae migrated from all cocoa under observation except in the experimentally treated stowage. Apart from that in the treated and control stowages, almost all cocoa which was in store during the moth counts had been removed in the normal course of trade before larval migrations began. Additional observations were, therefore, confined to ten bags of cocoa in observation stowage 2 and eleven bags in stowage 4; details are given in Table II.

Examination of the 75 cwt. of cocoa transported to the Laboratory confirmed that the larval migration could be taken as an accurate criterion of infestation by *E. elutella*. There were no living insects in the experimentally treated cocoa but, in the controls, in addition to a few *E. elutella* larvae which had not migrated, there



Applying a protective film of insecticide to the outside of stacks of bagged commodities by means of a portable electric sprayer.

were living beetles of the Australian Spider beetle, *Ptinus tectus* Boield., the Foreign Grain beetle, *Ahasverus advena* (Waltl), and *Henoticus californicus* (Mann). Both lots of cocoa contained various dead beetles, presumably killed by the fumigation.

Cost of treatment

Treatment of some 5,000 bags of commodity for a period of 5 months required 11 gal. of insecticide costing £25 and involved 15 man-hours for the application. The cost of insecticide and labour, therefore, was less than £30. It is possible that only four sprayings were necessary since, by September, there were no live moths in the experimental stowage. Spraying was continued, however, because moths were able to fly from nearby stowages.

Discussion

It must be emphasised that the comparison between the experimental and control stowages is not, as is usual, between equally infested stowages, one treated and the other untreated. In this experiment, the treated stowage was heavily infested at the start whereas the control was only very lightly infested and, furthermore, was subjected to the wharfinger's normal spraying programme. Conditions, therefore, were weighted against the experimental treatment.

Against this background, the clear-cut result demonstrates that, where the Laboratory's recommendations are strictly adhered to, clean, bagged cocoa can be protected at a relatively low cost from infestation by *E. elutella* even when the store is heavily infested. There is evidence that the experimental treatment also protected the cocoa from cross-infestation by some beetles. Observations in the past of treatments by many wharfingers and of the treatments given to the control stacks in the present trial have led to the firm opinion that any lack of effective control has been largely due to the

inexact methods used. The success of the Laboratory's treatment confirms this view, yet the extra time needed to ensure success is surprisingly little when the spraying is properly organised and efficiently carried out.

It should be emphasised that the control method described was developed for use in temperate conditions. The frequency of treatment must be related to the effective life of the pyrethrins which is greatly reduced in warmer climates.

Conclusions

Complete protection of bagged cocoa from infestation by the Warehouse moth, *Ephestia elutella*, can be obtained by spraying the outside of the stacks at monthly intervals with a mixture of 0.3% pyrethrins and 3.0% piperonyl butoxide at the rate of 1 gal. per 5,000 sq. ft. Successful control can be achieved, however, only by the conscientious application of suitable spraying techniques.

Acknowledgements

The investigation was made possible by the collaboration of The Nestlé Company Limited who put the cocoa

at our disposal and arranged the necessary facilities with the wharfingers. In particular the co-operation of Mr. H. E. Holland and Mr. F. J. Harrison of that Company is acknowledged.

Helpful advice in the course of the investigation and the preparation of this paper was given by Dr. E. A. Parkin. Assistance at various stages was given by Miss P. A. Mahon, Mr. P. S. Tyler and Mr. D. R. Wilkin.

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TABLE I
Numbers of moths counted in the experimental and other stowages

Date	Experimental			Control			Other stowages					
							1		2		3	
	<i>normal</i>	<i>affected</i>	<i>dead</i>	<i>normal</i>	<i>affected</i>	<i>dead</i>	<i>normal</i>	<i>dead</i>	<i>normal</i>	<i>dead</i>	<i>normal</i>	<i>dead</i>
26 Jun., 58	0	0	2	4	0	0	20	0	200	0	63	0
9 Jul., 58	30	28	91	108	0	0	1375	0	613	0	20	61
23 Jul., 58	16	65	1406	252	0	20	629	680	284	19	30	0
6 Aug., 58	6	17	2228	66	5	75	25	32	16	55	not counted	
20 Aug., 58	1	2	1855	20	0	85	6	0	3	80	not counted	
1 Sep., 58	0	not counted		16	not counted		not counted					

TABLE II
Numbers of larvae migrating from cocoa in the experimental and other stowages

Date	Experimental	Control	Other stowages	
			2	4
2 October, 1958	0	20	90	139
13 October, 1958	0	216	146	52
21 October, 1958	0	425	184	74
6 November, 1958	0	618	cocoa removed	7

Modern Insecticides and their USE for the Protection of Trees and Timber*

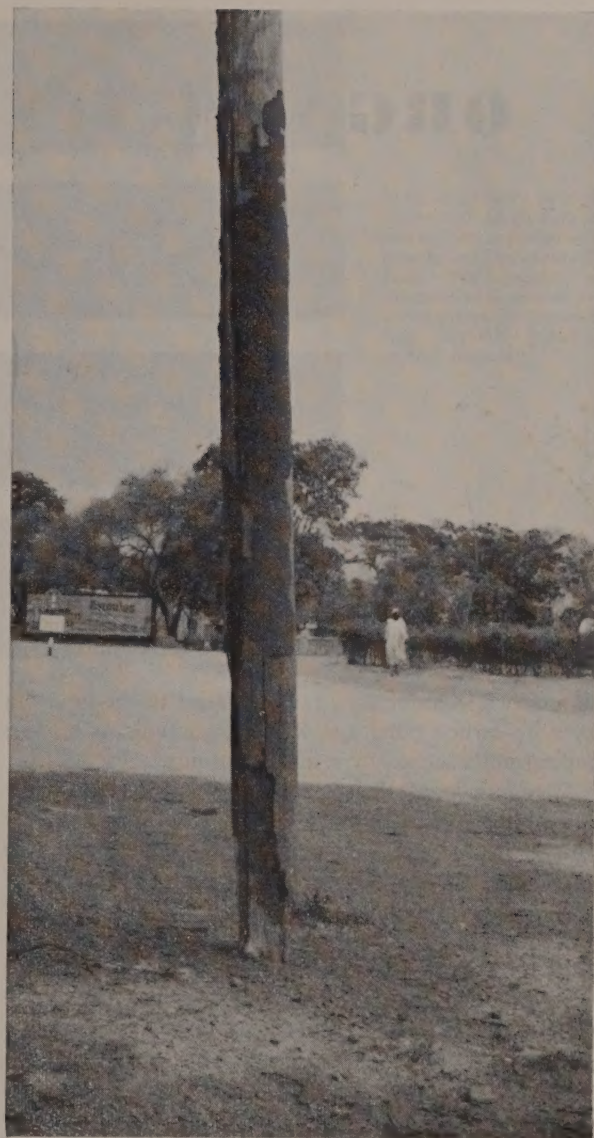
By D. BOOCOCK (*Technical Director, Standardised Disinfectants Co. Ltd.*)

TREES AND TIMBER are attacked by many different kinds of insect pest. To give a few examples:— pine weevils are dangerous enemies of young coniferous plantations whilst the foliage of mature trees may be eaten by caterpillars leading to the trees being weakened or killed, e.g. spruce budworm in Canada, nun moth in Germany and pine looper in this country. After felling, logs both in temperate and tropical climates may suffer damage by bark beetles and ambrosia beetles which in addition to the direct damage caused often spread the spores of fungi causing blue stain. Many species of hardwoods are attacked after conversion by powder-post beetles causing extensive damage if unchecked. Timber in use is likely to be infested by such well known insects as the common furniture beetle, death watch beetle and house-longhorn beetle which not only damage the substance but also the reputation of wood. In the tropics and sub-tropics termites cause untold damage.

During the last twenty years great advances have been made in the development of synthetic organic insecticides, the first and most famous of them being DDT. Many others followed and chemicals such as BHC, chlordane, aldrin, dieldrin and endrin are now widely used to control the insect enemies of wood in nurseries, forests and timber yards. They are applied by such processes as dipping, spraying, fogging and dusting with equipment ranging from small hand-operated apparatus to especially equipped aircraft.

Modern insecticides are so powerful that they are never used undiluted but must first be converted into a form suitable for application. The nature of the *formulation* will depend on the use and on the method of application. The efficiency of the insecticides itself is considerably affected by the nature of the formulation. The formulations most commonly used are solutions, emulsions, emulsifiable concentrates, water dispersible or wettable powders and dusts.

The modern synthetic insecticides, especially BHC and dieldrin, are also used in the manufacture of organic solvent type preservatives and woodworm killing fluids usually combined with fungicides such as pentachlorophenol. This type of product is proving increasingly



Transmission Pole seriously damaged by termite attack. Note the protective cover of earth built by the termites. Preservative treatment would have prevented this.

Photo courtesy of Standardised Disinfectants Co. Ltd.

useful both for preservation of new timber and for eradication of pests from timber already attacked.

In short, the modern synthetic insecticides provide foresters, timber suppliers and timber users with powerful new weapons with which to protect our dwindling supplies of timber from destruction by insects and their intelligent use can greatly help to conserve the supply and reputation of one of the finest and most useful natural materials.

** Author's own summary of a paper delivered to the Institute of Wood Science at a meeting held on Wednesday, 9th December.*

ORGANO-TIN COMPOUNDS

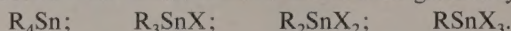
in

PEST CONTROL

By Dr. J. W. PRICE (Chief Chemist, Tin Research Institute)

Introduction

ORGANO-TIN COMPOUNDS are of four general types:



in which R is an organic radical linked to the tin atom by a tin-carbon bond and X is an inorganic or organic radical not attached by a tin-carbon link.

Compounds of the type R_2SnX_2 have been firmly established commercially for a number of years as highly effective stabilisers for vinyl chloride polymers¹ but little was known of the properties of the three other classes of organo-tin compounds until, in 1950, a systematic investigation by Van Der Kerk and his co-workers was started in Holland. This led to the discovery that some of these compounds, in particular those having the general formula R_3SnX , have strongly biocidal properties.² Laboratory trials showed that trialkyltin compounds possess a high fungicidal activity, and that this activity is of the same order of magnitude as that of the organomercury compounds. The discovery of these facts immediately led to the possibility of the use of a new class of compound in the whole field of pest control, and below are given the results of investigations so far published on the applications of organo-tin compounds in this way.

Wood preservation

Preliminary Petri dish tests showed that triethyltin hydroxide exhibits exceptionally high toxicity in agar to the common blue stain fungi, a concentration of 5 p.p.m. entirely preventing growth of *Ceratostomella pilifera*, *Endoconidiophora coerulescens*, *Pullularia pullulans* and *Cladosporium herbarum*. The same organo-tin compound was found to give complete protection against the sapstain fungi, *Ophiostoma piliferum* and *O. piceae* on freshly sawn Scots pine boards. In this test the boards

were dipped for 10 seconds in a 0.5% aqueous solution of the compound. The treated boards were then stacked, sprayed with a spore suspension, closely covered with a tarpaulin and left in the open air for 50 days.

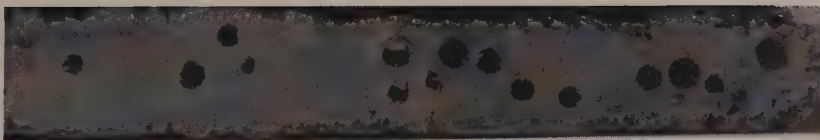
Following these encouraging results, the Tin Research Institute arranged trials in a tin mine in Cornwall and in a lead mine in Cumberland. In these trials pit props were pressure-impregnated in a 0.5% aqueous solution of triethyltin hydroxide and were installed in the mines adjacent to untreated props and in areas in the mines where fungus attack was very rapid. Inspection of the timbers at various intervals up to 4 years showed that in all cases the treated wood was unattacked by rot while the untreated props were badly affected.

Further laboratory investigations have been carried out at the Forest Products Research Institute T.N.O. in Holland.³ The high antifungal activity of triethyltin and tributyltin compounds was confirmed against fungi which cause brown rot and against one fungus (*Polystictus versicolor*) causing white rot. Exhaustive leaching of wood blocks impregnated with the organo-tin compounds showed that anti-fungal activity was well maintained after leaching.

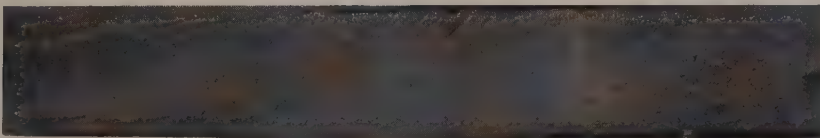
Recently a series of tests have been carried out in America⁴ on wood blocks impregnated with triethyltin, tributyltin and triphenyltin compounds and exposed to *Lentinus lepides*, *Lenzites trabea* and *Poria manticola*. Significant fungicidal toxicity was shown by all these three compounds but it was concluded from general considerations of cost, availability and leachability, that the tributyltin compound was the most promising and well merited further extended trials.

This same tributyltin compound, the oxide, because of its high efficiency against bacteria and fungi, is likely to

No treatment



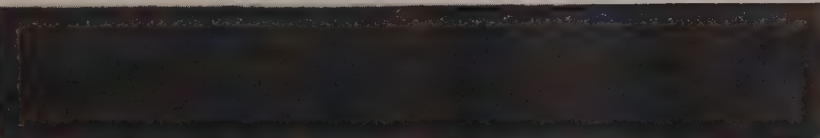
Triethyl
tin
hydroxide



Tributyl
tin
acetate



Creosote



These samples of timber (Common Elm) were immersed for a period of 18 months in Shoreham Harbour. Impregnation with organo-tin compounds prevented attack by *Teredo* and kept Gribble attack to trifling amounts.

Photo Courtesy
Tin Research Institute

be useful in the paper industry for the control of slime in water systems in paper and pulp mills. Here again the activity of the organo-tin compound is of the same order of magnitude as that of organomercury compounds.

That there is still need for further investigation in the paper pulp industry is shown in a report of some work carried out in Sweden⁵ in which successful pilot trials with tributyltin oxide could not be repeated on the plant scale. Nevertheless a number of paper mills in Canada have been using this compound with complete success.

Agriculture

There is no doubt that potentially this is the most important application for organo-tin compounds. Initially it was found that the simpler alkyl compounds, which showed such high fungicidal activity, were not suitable for use on plants because of their high phytotoxicity. It was soon found that these two properties can be modified by altering the alkyl or aryl groups attached to the tin atom, and in particular it was found by Farbwerke Hoechst A.G. in Germany⁶ that compounds such as triphenyltin acetate have a reduced phytotoxicity while still being excellent fungicides. A number of field trials have been reported and particularly successful results have been obtained against the leaf-spot disease of sugar beet (*Cercospora beticola*) the potato blight (*Phytophthora infestans*) and leaf-spot disease of celery (*Septoria apii*). In the case of sugar

beet and celery not only was control achieved over fungal attack but also significantly increased yields were obtained. This is obviously of the greatest importance, but whether this effect is due to a specific growth factor of the product is still undecided.

Here again further work is in progress, as the triphenyltin compound is still rather too active to be used on certain sensitive plants, but there seems no doubt that this and similar compounds are likely to find large uses in agriculture in the future.

Paints and textiles

The growth of mould on painted surfaces is often a cause of complaint by paint users, and it is common practice to incorporate some sort of fungistat in paints, though some of these fungistats are not entirely satisfactory. The results of comparative tests against a number of commercially used compounds were reported in 1956.⁷ These showed that in polyvinyl acetate emulsion paint tributyltin oxide (TBTO) has a very high fungistatic activity, being considerably more effective than chlorinated phenols or organomercury compounds. As a result of these tests TBTO is now in commercial use in some paints of this type.

Laboratory tests on flat oil paints showed that tributyltin acetate is effective in preventing mould growth at a concentration of 0.1%. Trials were also made using tributyltin resinates and abietates instead of the acetate, as these compounds, being less soluble in water, might

be more permanent in the paint film. These tests were disappointing as it was found necessary to increase the concentrations used to about 0.5% before good results were obtained. It now seems probable that compounds having an activity even higher than that of TBTO will be necessary before their extended use in paints becomes economically justifiable.

In the field of **anti-fouling paints** a number of raft trials have been carried out with organo-tin compounds. Here the difficulty has been to compromise between compounds which are too readily leached from the paint film, and others which are completely insoluble and so do not migrate through the paint film. In the first case excellent protection against marine fouling is obtained for a short period, after which no toxic material remains

in the paint, while in the second fouling again occurs after a short interval when the paint surface is stripped of toxin but while plenty of it still remains in the paint film. One or two tributyltin compounds gave promising results however and this field certainly merits further investigation.

Textiles

Studies have recently been reported⁸ on the rot-proofing of cellulose-containing textiles such as jute and cotton with organo-tin compounds. It was found that the simpler compounds such as TBTO, while effective in the freshly-impregnated material, were not sufficiently fast to leaching. Mixed trialkyltin compounds however such as diethyllauryltin or diethyloctyltin acetate, were



These two logs stood in Geevor Tin Mine, Cornwall, England for three and a half years (November 1953 until May 1957). The atmosphere was perpetually saturated and favoured the growth of mildew and moulds.

*The log on the left was NOT TREATED and has rotted badly due to 'dry rot' (*Maerulius lacrymans*) and to other unspecified organisms.*

The log on the right has been TREATED with TRIETHYLTIN HYDROXIDE and has suffered no deterioration from moulds and fungi. The wood is not discoloured by the chemical and there is no odour from it.

found to be very active at low concentrations as well as being fast to leaching.

Insecticides

Preliminary trials showed that triethyltin hydroxide at a concentration of 0.25% afforded complete protection to wool against the **larvae of the clothes moth** and the **American carpet beetle**. It was later found that the tributyl compound was rather more effective than the triethyl, and it was established that the mode of action of these compounds is twofold: they are toxic in themselves and they interfere with the digestibility of the wool by the larvae. Tributyltin oxide was found⁸ to be as active against *Tineola bisselliella* and *Anthrenus vorax* as is DDT, but its mode of action suggests it has a more direct toxic effect than that of DDT. It has, however, one important disadvantage in that it is not fast to washing, and so far attempts to remedy this defect by the introduction of other groups into the compound have not proved successful.

Some tests have been carried out on the use of triethyltin hydroxide and its esters against **houseflies** and **mosquitoes**.⁹ High kills of both these insects can be obtained with concentrations of 1% of the organo-tin compound in liquid paraffin, owing, it is thought, to the paralysing effect of the vapour of the compound. At lower concentrations all insects are "knocked down" but revive after a few hours, and experiments on true contact toxicity showed that organo-tin compounds are inferior to DDT. It seems however that advantage could be taken of this high rate of "knock-down" by adding an organo-tin compound to a spray containing DDT.

A number of tests have been made of organo-tin compounds for the protection of wood against **termites**. Some of these have appeared rather inconclusive but there is no doubt that such compounds as triethyltin hydroxide and TBTO are toxic to termites, and reported failures of some impregnated wood samples may have been due to some other factors. Successful results have been reported⁴ in which southern pine sapwood impregnated with 0.2-1.5% of TBTO remained completely unattacked after 12 months exposure to an active colony of termites. A similar compound, tributyltin acetate, was found to be strongly toxic to *Calotermes Flav.* at a concentration of 0.3% and to afford almost complete protection at 1.0%.

Bactericides

The problem of the increased danger of bacterial infections in hospitals has become serious as well as wide-spread during the last few years. It is thought that this problem is caused by the dissemination of strains of

bacteria that have become resistant to antibiotic drugs, the most prominent among these resistant strains being *Staphylococcus aureus*. A system of bactericidal conditioning for hospitals has recently been developed in America¹⁰ which has been found very effective against this type of bacterial infection, and if the further hospital trials now in progress confirm the excellent results obtained originally in a hospital in New York, the methods used are likely to have wide application.

In this system the air in a hospital ward is subjected to continuous bactericidal treatment by incorporating a bactericide in all air filters. In addition all metal and glass surfaces, walls, ceilings and floors are treated with a formulation containing tributyltin oxide, and finally blankets, sheets and mattresses as well as staff uniforms, are treated at the hospital laundry by addition of TBTO to the rinse waters. The concentration of bactericide in the rinse waters is chosen so that substantivity is maintained only until the next washing cycle, though a more permanent effect can be obtained for example with blankets by increasing the concentration of the bactericide. In a controlled hospital trial of this system it was found possible to reduce the number of bacteria in the hospital air by at least 80% over a period of six weeks.

From the foregoing brief outline of the subject it is evident that certain organo-tin compounds of the type R_3SnX , show a high degree of biocidal activity. A number of these compounds are being manufactured both in this country and in America, and they are likely to become of increasing importance in the future development of pest control.

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Notes from the

SMITHFIELD SHOW

SMITHFIELD, considered by stockmen and manufacturers of agricultural machinery to be the show of the year. Should there be any Doubting Thomases who disbelieve this they should have gone along and seen for themselves the representatives of the various firms, answering queries, writing out orders and generally moving around like cats on hot bricks.

Our interest naturally centred on spraying and other machines used for the application of crop protection chemicals and we can honestly say that we have never seen such happy faces amongst the representatives of this industry. Throughout the whole show there was not one complaint of bad or indifferent trading and the public showed a high degree of interest.

Replies to our question, "What has been the public reaction to your products?" ranged from "good" and "very good" from the more cautious, to "excellent," "brilliant," "never been better," from others. The fact that pleased us immensely was the high interest shown by overseas visitors to the show.

E. Allman and Co. Ltd.

The company were exhibiting a representative selection of their range of spraying machines from the **Hand-op** which, as its name implies, is a hand-operated dusting machine and **Rapid Sprayer** which is a push model for use on market gardens and sports grounds; through the 40 range, which includes the **Genimec**, a medium/low volume sprayer with an 18 ft. boom and the **Speedispray 40** which also has an 18 ft. boom, and the 60 range, which includes the **Plantector** medium/low volume field and hop sprayer and the **Speedispray 60** low volume sprayer. Completing the selection was the **Universal Model 100**, high/low volume sprayer which is fitted with

a 20 ft. or 30 ft. spray boom. Also on show were several recent additions to the Allman range, these were the **Portable High Pressure Washing Unit**, the operating pressure of which is 400 p.s.i., pneumatic tyred **Row Crop** wheels, the **Sussex Fertiliser Spreader** and the **Speedispray 60**. Brief details of the latter two machines were given in the November issue of *Pest Technology*.

Baywood Chemicals Ltd.

After the great success attained earlier this year with their systemic insecticide, Metasystox, which played a great part in preventing widespread devastation amongst the sugar beet crop (see *Pest Technology*, Volume 1, Nos. 10/11), this company naturally devoted the main interest to "A panoramic presentation of the spraying of sugar beet."

Information concerning other products of *Farbenfabriken Bayer A.G.* and of the products of *Burt, Boulton & Hayward, Ltd.*, was also available.

Boots Pure Drug Co. Ltd.

Boots exhibited a selection of their wide range of crop and animal husbandry products. Perhaps the most interesting of these were the Cornox range of weedkillers which have been reduced in price as a result of this year's (1959) record sales.

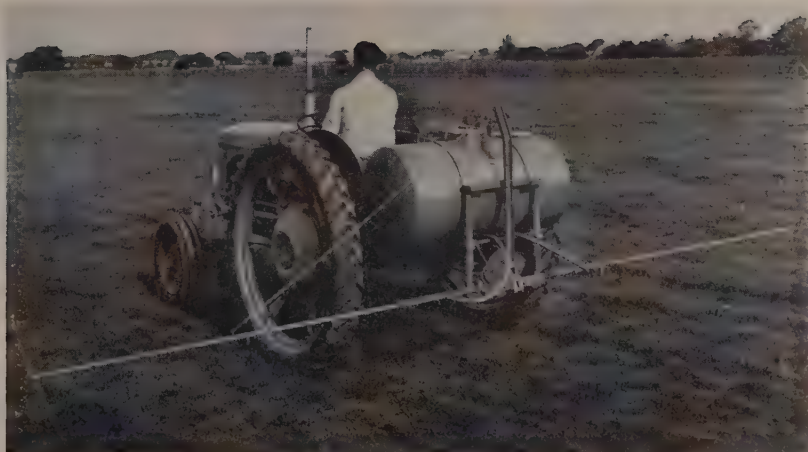
The high interest in Boots products which has been evident throughout 1959, was maintained at the show.

J. W. Chafer Ltd.

The main attraction on this stand was the Chafer **Dustmaster** a recent addition to the Chafer range.

It is a precision dusting machine for mounting on the three point linkage of the tractor, with power provided from the power take-off. It is pre-set to apply 5-6 lbs.

*The Speedispray 60
manufactured by
E. Allman & Co. Ltd.*



of Dustox dusts per acre and any minor adjustment may be regulated by the slide fitted inside the hopper. A high speed shaft is driven from the power take-off and in turn motivates a positive worm through a special ratchet reduction gear. This ratchet reduces the speed of the power feed worm to 1/80th of the high speed shaft. The patented multiblade high efficiency blower is again driven by pre-stretched triple Vee belts from the p.t.o. drive. All bearings are sealed for life.



The weather proof hopper has a capacity of $2\frac{1}{2}$ cwt. of Dustox dusts, sufficient for 50 acres. The dust is driven by the high efficiency blower along the booms and into the crop through apertures fitted with fish-tails or streamlined inter-row downpipes so that the dust settles evenly on all the foliage. These downpipes are easily removed or adjusted as necessary. The boom width is 36 ft. and the booms can be folded from the tractor driver's seat. All parts of the Dustmaster are treated against corrosion and the whole machine when detached from the tractor will stand on its own legs. Special high clearance wheels are available which when the front axle is converted gives a much greater ground clearance.

A new development with this machine is that the booms can be removed and replaced by two large fish-tails, which can be swivelled through 360° and directed to any height. In hops, for which this adaption is primarily designed, the machine on trial plots went down every fourth alley and gave excellent cover.

Also on show was one of the 200 gallon **Q.F. Sprayers** which have been designed as universal machines and can be used for spraying most types of chemicals. The tanks are lined to resist corrosion and fitted with tank capacity and pressure gauges, the spray booms have a 32 ft.

*The
Chaper Dustmaster*

*Above—
Fishtail fitting for
Hop Dusting*

*Right—
Boom fitting, dusting
for copper deficiency
on grassland*



coverage comprising of one centre and two sidearms which can be swung up to a vertical position for travelling between one spraying area to another. The boom is adjustable in height from 18 in. to 53 in. and is fitted with special antidrip "U" type jets which can be fitted with underleaf downpipes if required. The wheel track is also adjustable from 56 inches to 63 inches.

Other aspects of this company's activities were demonstrated and some of the pesticides that they use and market were on show, these included various selective herbicide formulations of MCPA, CMPP etc. and Weedone L.V.4 a product of Amchem Products Incorporated U.S.A. which is manufactured in this country by A. H. Marks & Co. Ltd. It is formulated from the volatile ester of 2,4-D for the control of Knot-grass, Redshank, Poppy and many common weeds and has proved itself to be a most effective weedkiller against these weeds.

Cooper Pegler and Co. Ltd.

A wide selection of this company's knapsack and hand sprayers was on show, including the recently released **Hurricane Knapsack** mist-blower and duster. Of the hand sprayers a small neat and attractive model, the **Plafog** attracted a great deal of interest. In this country its main use will be found in the application of insecticides, foliar nutrients etc. to greenhouse plants, and roses etc., although it was originally designed for use in coffee and cotton crops.

The **Mapic D.5** soil injector, a new release which was reported in our December issue has had a good reception and is reported to be selling well particularly in Jersey, Ireland and other overseas countries. It has been developed for disinfecting the soil by the injection of insecticides, fungicides and nematocides under high pressure. It is also proving valuable for the application of trace elements and fertilisers.

Dorman Sprayer Co. Ltd.

This company's stand attracted a great deal of interest and several new machines were exhibited, which were demonstrated at Teversham on the 17th and 18th November. As reported in our December issue these machines included a new high efficiency high/low volume **Orchard Sprayer** produced in conjunction with Lindinger of Copenhagen; 60 gallon High Pressure mounted sprayers, mechanically agitated tanks and with high pressure piston pumps manufactured under licence from the Australian Sewell Company, and a 60 gallon air assisted low/medium volume sprayer suitable for both hop and fruit spraying. There were several other machines from the company's wide range of mounted equipment. In addition the Company's range of knapsack sprayers was represented, notably by the **Osprey Ace** which can be used as a mister, duster or flame thrower. This machine has been very successful both at home and

in a number of overseas markets since its introduction less than a year ago.

Drake and Fletcher Ltd.

There was a continued success at this year's show with previously introduced machines such as the **Unimount** (1957) mounted mist-blower which has twin fans for double or single sided spraying and an unchokable nozzle system for high/low volume spraying of fruit, hops etc.; the **Junimount** a similar machine with a single fan for single sided spraying and the **Wasp**, (1958) a mounted mist-blower, which has adjustable N.I.A.E. nozzles to allow the spray pattern to be changed to suit every purpose and light non-corroding 70 gallon glass fibre tank, used for concentrate or normal volume spraying of hops, fruit etc. However, the main attraction was the newly introduced **Victair** all volume mounted mist-blower for hops and fruit. This highly promising machine has been designed with the following points in mind. There are a large number of growers with small acreages who cannot economically afford the powerful mist-blowers of high capacity, which are on the market. Yet the trees on the small acreages have the same requirements, insofar as penetration and coverage are concerned, as the trees in larger areas. Therefore, the aim was to produce a mist-blower for efficiency and economy in labour with the air power and penetration for big trees at a really low price and capable of both high and low volumes. Drake & Fletcher believe that they have achieved this by careful thought and simplicity of design and claim that there is no competitive mist-blower, either British made or imported, on the market today, except at double the price or half the capacity.

The basic fruit model is single sided with the pump and fan unit mounted on tractor draw bar. The pump is a Roller Vane in brass with nylon rollers. The powerful fan has a fair output of 9,000 c.f.m. at 140 m.p.h., and can be directionally controlled. The 150 gallon



*The Victair mistblower manufactured by Drake & Fletcher.
Single side spraying*

galvanised tank is drawn behind the tractor. The output with single sided spraying is in the range 20-150 galls. per acre in average fruit, however, by the addition of a second pump, an operation which can be carried out in 20 minutes the output can be doubled.

For hops, cordon and pyramid fruit and soft fruit the fan and outlets can be changed within 30 minutes to give double sided spraying over an 180° arc. The output, in this case 20-250 g.p.a., can also be doubled by the addition of a second pump.

The Victair is expected to open up a vast new and virtually untapped market insofar as high and low volume mist blowing is concerned viz. the small grower and does not compete with the company's previously introduced Unimount and Wasp.

This company's machines attracted a great deal of attention at the Smithfield Show and the considerable interest shown augurs well for the future of their machines.

Gordon Felber and Co. Ltd.

The main attraction for *Pest Technology* was the model 303T **Microsol** Mist Generator, marketed by the above Company and shown for the first time on their stand at the Smithfield Show. It has been designed to fog out any specific space and ensure that the whole space is completely treated by the chemical being used, whether this is an insecticide, a bactericide or a fungicide.

It is fitted with small rubber tyred wheels enabling it to be pushed into most types of space, and is light enough to be lifted by two men over obstacles, up onto loading banks or bays, and carried upstairs or into other awkward places.

Therefore, by using the right number of machines placed in the right positions, any size of building can be adequately fogged out. The fact that the head may be elevated or depressed at will, plus the fact that the whole unit when being wheeled is capable of elevation and depression over a wide arc, ensures that unskilled labour, once shown how to operate the unit, can attain and maintain a high degree of positive control.

The **Microsol** 303T has a tank capacity of 4 gallons and is 43 inches high by 24½ inches wide and 22½ inches from back to front. It weighs 75 lbs., has an output of up to 25 gallons per hour and generates particles of from 10 to 120 microns in diameter. The ⅓ h.p. electric motor is of the Fully Enclosed Universal type.

The **Microsol** 303T is capable of dealing with spaces up to 200,000 cubic feet.

Imperial Chemical Industries Ltd.

With an organisation such as the Imperial Chemical Industries producing such a wide range of Insecticides, Weedkillers, Seed Dressings, Fungicides Machines, and other products used in the agricultural world, it is



The new Microsol Mist Generator, the 303T, which was shown on the stand of Gordon Felber & Co. Ltd.

practically impossible to exhibit a truly representative selection. The main part of the stand was taken up by the **Plantector** Seed Treater which was described in our November issue.

In addition to Plant Protection Ltd., the Pharmaceuticals Division and I.C.I. Game Research Station was represented.

Kent Engineering and Foundry Ltd.

Amongst the machines exhibited was the Tractor Mounted **Powermist** Sprayer, a powerful machine for spraying high, medium or low volumes in fruit trees and hops, with the tank—generally of 200 galls. capacity—drawn behind and the **Penetrator**, a high speed air

sprayer with dual centrifugal fans giving deep penetration for mist spraying orchard trees and hops. There is a narrow model of the latter machine for work in hops and a new special low model for orchards, it has a 200 gallon tank, twin adjustable spraying outlets for high, medium and low volume applications.

New to the show was the **Conomist** swan necked tractor mounted sprayer which is attached to a medium sized tractor on a three point linkage. The specially designed 10 galls. per min. pump and the blower are driven by the all enclosed gearbox, a centrifugal coupling prevents overload, there being no vee-belts or chain drives. The 65 gallon fibre-glass tank has liquid agitation. Eight, four or single atomising outlets are quickly interchangeable and can be moved for directional spraying. Also introduced this year and new to the show was the **Motoblo** a shoulder-mounted, engine driven, mechanically agitated combined mist or mist and dust blowers. Additional attachments are a flame thrower and fogging unit. The Motoblo is suitable for a wide variety of applications including soft fruit, bush apples, and pears, broad and runner beans, lettuce, tomatoes etc.

Kent Engineering & Foundry were very pleased with their reception at the Smithfield Show and one of the enquiries they received concerned the exportation of 300 Conomist sprayers to South America.

Kestrel Engineering Co. Ltd.

The recently introduced **Kestrel** lightweight polythene safety knapsack sprayer for all powders including neat sulphur, was on show for the first time. This machine was described in our December issue.

E. C. Longmate, Ltd.

No products or spraying machinery were on view although booklets, and leaflets concerning Longmate's spraying chemicals and machinery were available. Representatives of the company were on the spot to give particulars of spraying machinery and the company's contract spraying services and sprayer loan service.

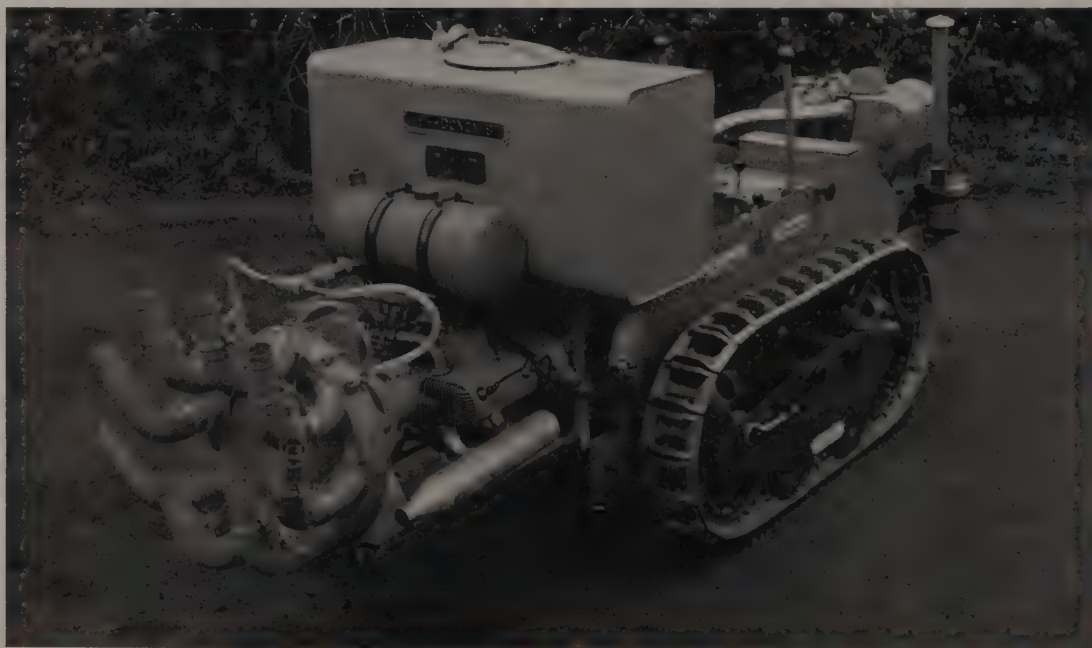
As could be expected with this well known company interest was high and they were well pleased with the show.

May and Baker Ltd.

With regard to the layout of their stand May & Baker were in the same position as other exhibitors who are mainly concerned with the manufacture and marketing of agricultural chemicals, there are no bright shining machines to draw attention, and cans of weedkiller could hardly be labelled attractive even if they were chromium plated. No! the only way out is to have an attractive stand with sufficient literature and representatives available to answer all queries. In this May & Baker succeeded and information concerning their selective range of weedkillers could be readily obtained. From this stand we learned that the recently introduced **Turbosan**, a copper/ziram formulation for the control of potato blight had given some promising results in trials.

Micron Sprayers, Ltd.

Two entirely new machines were on show, they are: The **Micron Vinyard** sprayer designed mainly for the spraying of vines but also suitable for the spraying of raspberries, blackcurrants, cordon fruit or any crop grown in rows with a maximum spacing of 9 ft. and



Conomist Em 30 mounted on Ransomes MG Crawler Tractor

height of 9 ft. The sprayer is mounted on the backplate of a Ransomes MG6 tractor or a David Brown 2D and is p.t.o. driven. The spray tank has a capacity of 6 galls. which is sufficient to spray two acres. A fitting with a 13 gall. tank is also available for the David Brown 2D tractor. A small, gravity primed centrifugal pump delivers spray liquid to the rotary atomiser, the output of liquid being regulated by restriction jets (with various sized holes) inserted in the feed pipes just behind the atomiser.

The new 18 in. diameter rotary atomiser (which is driven by a V-belt from the p.t.o. shaft) breaks the spray liquid up in to fine uniform sized droplets and a sufficient air blast is generated by the atomiser to give the droplets an initial throw of 9 ft. diameter.

The **Micron Tomato Sprayer** has been added to the Micron range at the special request of numerous growers who specialise in the growing of outdoor tomatoes. This unit is also suitable for the spraying of cordon fruit, vines, blackcurrants etc. It is designed to be pulled by the operator down the rows, spraying to both sides.

The unit comprises a lightweight one-wheel trolley, a JAP 34 c.c. engine, a rotary atomiser, a gravity primed centrifugal pump and a spray liquid container. Robustness and ease of operation have been of main importance in the design of this model whilst maintaining the efficiency of spray deposit.

A new 18 in. diameter rotary atomiser is fitted on the Tomato Sprayer which breaks up the liquid into fine uniform sized droplets of approximately 80 micron. This atomiser generates sufficient air blast to give the spray an initial throw of 9 ft. diameter which ensures a good deposit of spray on all parts of the foliage. As the spray is ejected in a complete circle, the lower arc is bounded by a trough which catches the liquid and returns it to the tank, thereby saving the wastage of spraying the ground.

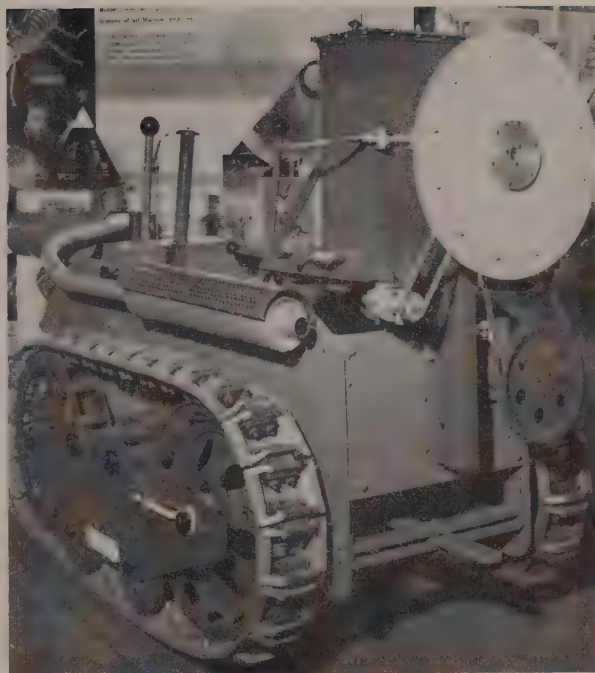
The spray tank is divided into two sections interconnected by a pump, one running on each side of the wheel. The total capacity is $2\frac{1}{2}$ gallons sufficient to spray an acre of tomatoes before re-filling becomes necessary.

Shell Chemical Co. Ltd.

It is perhaps unnecessary to say that information pertaining to the wide range of herbicides, insecticides, fungicides and other crop protection products manufactured and marketed by this extensive company, was readily available. The greater part of the stand was taken up by a demonstration model of the recently introduced **Model A Seed Treater** which attracted a great deal of interest and details of which have been given in our November issue.

Vigzol Oil Co. Ltd.

Exhibited were the **Blitzweed** Spraying machines, LV60 for low volume, MV60 for medium volume and



The Micron Vineyard Sprayer

in addition the new Mk. V MV80, which handle all agricultural chemicals with the exception of sulphuric acid.

The capacity tanks are double resin lined to give maximum life, spray bars fold to stow and have a channel to protect nozzles and piping from damage.

The company also manufacture and market a full range of weedkillers and other agricultural chemicals in addition to tractor lubricants and rust preventives and other products.

Watson Sprayers

The Watson Mistblower **Xtra Penetrator** had a good reception both from home and overseas visitors, probably because of its versatility. It is a multi-purpose tractor mounted liquid mistblower and powder duster for all uses with winter, spring and summer washes and sprays. There is air assisted "power penetration" of small droplets at all volumes per acre from semi-concentrate to high volume. Spray height ranges from ground level to trees requiring a 60 stave ladder. Agitation is provided to cope with the difficulties of suspension sprays and washes. It is claimed that the mist-blower is so multi-purpose that it can be used on most farms for 9 months of the year covering fruit, top and bush; soft fruit of all kinds; hops, row crop work; general ground crops and weed control work; liquid spraying, powder dusting or drift dusting. The weed control spray boom giving 22 ft. coverage and the spray bars for chemically stripping hops can be fitted in a matter of minutes.

PARLIAMENT and PESTICIDES

The following account is composed of extracts from "Hansard" Volume 613, No. 22, in which the Commons debate of 20th November, 1959, on Toxic Sprays, is published. We hope to find space to publish further extracts from this debate in subsequent issues, as it is we have had to exclude some of the news items which would have appeared in this issue.

We believe that the questions asked and the answers desired are of tremendous importance to the Pesticides Industry, indeed not only to this industry but to agriculture and the community as a whole.

A few minor sections from the debate have been omitted, however, we believe that this in no way alters or twists the opinions originally conveyed. We mention this point as agricultural chemicals have recently been subjected to adverse publicity in the Daily Press—in some cases due to articles being quoted out of context. Also the few cases where accidents have occurred unfortunately appear to be more sensational and newsworthy than the many hundreds of times that spraying has been carried out successfully and to the benefit of the population.

Readers comments on the debate would be read with interest and whenever possible, published.

Mr. John Farr (Harborough): I beg to move,

THAT THIS HOUSE, in view of the increasing use of toxic sprays in agriculture, the growing damage by spray drift and the absence of any definite knowledge of the effect of these chemical substances upon human beings, domestic animals, wild life and crops, calls upon Her Majesty's Government to set up a commission of inquiry to examine the matter and to make recommendations.

I have the honour to represent the Leicestershire constituency of Harborough. It is a constituency of a gently undulating countryside, with several industrial, urban and suburban areas in the middle of it. The problem which I am trying to bring before the House today is not one, however, which concerns the Harborough countryside alone, but is rather one which, I submit, concerns the countryside of the whole of Britain today. It is the problem of the toxic sprays and their application to our countryside.

For some days, I have engaged myself in fairly diligent research into this topic, and I have been struck by one particular thing. Not only is very little known of the short-term effects of toxic sprays upon the countryside, but practically nothing is known about the long-term effects. Moreover, so far as I can find out, there is no co-ordinated and organised research into this problem going at the moment. There are certain firms and one or two other bodies which are making investigations into specific causes for investigation in connection with toxic sprays but no overall investigation is being conducted at all.

My hon. Friend the Joint Parliamentary Secretary is

doubtless aware of the excellent Reports produced by the three working parties under Sir Solly Zuckerman. The first came out in 1951, the second in 1953 and the third in 1955, and even as long ago as that—four or five years ago—these working parties were unanimous in calling for more and intensive investigation into the use of toxic sprays.

In 1953, the acreage of our countryside which was being sprayed annually was just over 20 million, and today I estimate that the problem has increased to such an extent that the annual acreage of our countryside which is sprayed is over 5 million. Moreover, since the last of these reports was produced, there have been several disturbing incidents which have occurred in the country. The first, which I consider is probably of major importance, occurred in September this year, when a lady in Herefordshire died from consuming inadvertently a quantity of potato top killer called Stemmex. The jury at the inquest on this unfortunate lady declared in a rider which they added to their verdict that the use of arsenical sprays in agriculture should be prohibited.

I should like to reinforce the jury's plea by asking whether or not it is a fact that arsenate potato haulm killer came into general use when sulphuric acid was in short supply, and if investigations cannot be set on foot in order to determine whether there is not some more suitable potato top killer, probably with a sulphuric content, which can take the place of these arsenate chemicals at present in use. Moreover, if such a chemical is produced to kill potato tops, as soon as it is produced, and not before, all arsenical potato top killers should be immediately abandoned. I fully recognise that treatment

of these millions of acres of the countryside are absolutely essential to the efficient operation of British farmers, but I submit that not enough attention is being paid to the effects of these applications.

The hon. Member for Essex, South-East (Mr. Braine), in July this year, referred to the terrific damage done to bees in his constituency. Bees with their pollinating abilities are one of the farmer's, the fruit grower's and the horticulturist's best friends. They produce on an average over 1½ million tons of honey which is sold on our markets. But they have suffered tremendously.

The bees in Sussex are only one instance of countless cases this year alone where bees have died through coming into contact with sprays or poisons designed to kill harmful insects. The president of one of the county bee-keeping associations has described the bee population of this county as being decimated, and it is a matter of interest to know that today there are only one-third the number of people keeping or able to keep bees in this country as compared with pre-war days.

A further instance of where the use of toxic sprays has had very serious results—an instance which, I submit, can be repeated countless times—is that of a field of sugar beet in Lincolnshire which was sprayed with a chemical called Phosdrin produced by the Shell Company designed to combat an attack of green fly. The next day an examination was made of the sugar beet. Not only were all the green fly found to be dead, but, moreover, on a diligent search being made there was found to be not a single living creature of any sort in the field. In fact, nine young and old pheasants and partridges were picked up.

Again, I claim that this is a matter which calls for more organised investigation. If it is possible to develop selective weed killers, why cannot we develop selective insect killers so that the insecticides that are applied will do only the job for which they are designed, will kill only the pests which it is desired to eradicate and will leave alive and unharmed all the beneficial small insects, such as moths, ladybirds, butterflies and beetles, and also, to a lesser extent, birds? I am not today proposing any specific reform, but I am asking that investigation be set afoot to study the long-term effects.

What result is this indiscriminate killing of insects going to have on the balance of nature? Are we going to suffer from plagues of harmful insects in the near or distant future as a result of inadvertently killing their natural predators? What will be the long-term effect of the build-up of toxic sprays and chemicals in our soil.

Another aspect of the matter which calls for very urgent investigation is that of spray drift. Many cases are reported annually by horticulturists and market gardeners of spray drifting from nearby farming operations on to their crops. The spray of toxic chemicals can drift up to one mile and can ruin crops of vegetables.

I know that farmers generally are very careful men. They will not normally apply a spray if they think the weather conditions are unsuitable for its application or if it is likely to spread beyond the field to which it is applied. But I submit that they are working under great difficulty where some of the lower volume applications have such a minute size of droplet that it becomes a tiny spray, which in the slightest windy conditions, in conditions with only a gentle breeze, is capable of drifting in this form for hundreds of miles.

I should like my hon. Friend the Joint Parliamentary Secretary to ask my right hon. Friend whether it is possible for two aspects to be considered. First, I should like to know whether or not it is a fact that if the latest type of nozzles were used, if spraying pressures were kept below 15 lb. per sq. in., a great deal of the spray-drift would disappear, and, moreover, we would not be likely to see next year an increase in the number of spray-drift cases of damage as have been reported this year.

My second point in this connection is one that calls for urgent investigation. At the moment, a horticulturist or market gardener who wants to protect himself from possible spray-drift damage has two courses open to him. The first is that he can arrange with an insurance company to have his crop insured against such possible damage. The second is that he has the opportunity, if his crop is not insured, of going to the farmer who has inadvertently damaged his crop and either settling the matter over the fence or going through normal legal channels. I submit that neither of these alternatives is very satisfactory.

In particular, my attention has been called to cases in Yorkshire where insurance companies are telling the grower of a damaged crop of lettuce or cauliflower "It does not matter whether you think these crops are fit to eat or fit to sell. You must salvage them. You must get what you can for them before we will settle your insurance claim for the balance."

I have in mind a case of a man in Yorkshire who, for four hours, suffered from drift from M.C.P.A. on his crop of lettuce which happened to be ready for cutting. He considered, and several other growers shared his opinion, that this crop was quite unfit for human consumption. Nevertheless, he was forced to market it and get what he could for it because his insurance company refused to consider his claim until such time as he had salvaged what he could and had got what he could for it.

I suggest that an entirely new aspect of approach by the Ministry is necessary. In future, where cases of spray-drift damage occur cannot the grower or horticulturist immediately contact his local Ministry officials or N.A.A.S. officials and ask them to examine the damage at once? Cannot the Ministry officials then have the authority to condemn his crop and declare it unfit for

human consumption in the national interest? Cannot we then have compensation paid to the grower by the Government, on similar lines as compensation is paid to farmers and poultry keepers—for instance, in the case of foot and mouth disease in cattle, fowl pest in poultry and swine fever in pigs? This is urgent and calls for some action to see that the housewife is not faced with the possible chance of inadvertently consuming vegetables which have been damaged by poison in one respect or another. The instances that I have given are only a few of the many which I unearthed in this very complex subject.

I am glad to feel that it is generally recognised in this country that hedgerows provide a very important reservoir of natural wild life. I think I can say with confidence that hedgerows are not sprayed at all, except in special cases such as at the corner of a road, or where there are beds of particularly noxious and contagious weeds. I am concerned to learn, however, that the same knowledge and respect which is applied to hedgerows is not applied to our rivers and streams, and particularly not to fish.

I have received letters from several bodies in Scotland saying that, in their opinion, damage by chemical spraying of their rivers, damage to the fish and the food on which fish feed, has reached such serious proportions, especially in the damage to spawning grounds, that they class spray-drift and chemical spraying damage on a par with damage at present suffered from industrial and sewage pollution.

I fully realise that agricultural sprays help the British farmer to do a difficult job well. I do, however, ask that a commission of inquiry into the whole complex subject should be appointed. I ask that this commission should examine the short term and the long term effects of these sprays. Can we develop sprays just as efficient and economic which will do the job designed only and not leave whole tracts of our countryside completely devoid of any form of wild life after their application? Can we have examined the effect of the annual build-up of toxic chemicals in our soils? Can it be arranged that agricultural colleges, when they instruct students in the use of toxic sprays, may also instruct them in the dangers of the poison value of toxic sprays?

Finally, I ask if we cannot now establish a permanent research centre whereby all problems connected with toxic sprays and their application can be investigated and whose job it would be to study chemo-warfare in agriculture to see that the advances our scientists have made are used as fully as possible but applied with care and understanding of the effects upon other possibly lower forms of life.

Colonel Tufton Beamish (Lewes): I beg to second the Motion.

This is a very complicated subject. I have here an

article which I tore out of the *British Farmer*, dated 5th September. It is headed "The use of poisonous substances in agriculture." The article contains no less than 28 injunctions to employers and employees which have to be carefully followed if serious risks are to be avoided. Although I have great admiration for farmers and farm workers, who returned me to the House with such a handsome majority, I very much doubt whether they can be expected to have the technical knowledge to handle all these poisonous substances with safety.

The article states:

"Among the chemicals now in use in agriculture and horticulture are some that are so toxic that unless handled with care fatal poisoning may occur."

As I have said, this is a very complicated subject, and I am sure that my hon. Friend the Parliamentary Secretary will be the first to agree with that, because his Ministry regularly issues detailed warnings to farmers on exactly how these substances should be used.

In the last few days, since my hon. Friend was kind enough to ask me to second the Motion, I have been trying to assemble all the evidence possible on this subject. I found a powerful piece of evidence in the *News Chronicle* of 10th October. This morning, I was in touch with the journalist who wrote this report. I should like briefly to read a few extracts from it. Incidentally, I understand that this report is based on some informal meetings recently set up by the Council for Nature. This is what the report says:

"Chemists, doctors, animal and plant breeders, and naturalists produced evidence at a series of conferences in the last fortnight to prove that the harm caused already by indiscriminate use of chemical sprays may be irreparable . . . Birds and insects which prey on the insect pests, and bees which are vital to fruit and other crops, are all being killed by indiscriminate spraying . . . If scientists have their way the Government will prohibit the use of chemical sprays that are now known to be injuring human beings. Other sprays will be permitted only during those months when animal life is not likely to be endangered. Hormones instead of chemical poisons will be used in future in insecticides."

I should like to interject that one of the pieces of advice given in the Zuckerman Report was that the use of hormone sprays might involve danger to livestock. I understand that some of these hormones make ragwort and other weeds tasteless. We have to be very careful about these things.

The *News Chronicle* article concludes:

"The Government will be asked to investigate the theory that the insect pests are developing immunity to sprays. The scientists believe that because of this immunity 22 of the chemicals now being used on farms are killing plants, poisoning animals—but leaving untouched the creatures for whom they were intended."

I believe that to be a responsible Report based on scientific study groups, and the House should take careful note of it.

I also noticed in *The Times* of 20th October a letter from the Honorary Secretary of Council of Nature. If the House will forgive me I will read this letter, because this is the kind of evidence from experts which is much more valuable than any views which I may hold:

"The annual general meeting of the Council for Nature, held on 8th October, passed a resolution which welcomed the public-spirited action of a large firm of manufacturers in withdrawing their supplies of an arsenical spray, urged, that the use of arsenical sprays should be prohibited forthwith, and asked that the Government and their agencies should give high priority to research into the long-term effect of toxic sprays on the complex associations of wild plants and animals, including the birds and insects, which inhabit the British countryside."

This Council represents thousands of naturalists all over the United Kingdom.

I also took from *The Times* an amusing report about a serious matter, headed, "The Cranberry Scare in America." I will not read an extract from this, but my recollection is that only two or three weeks ago the Secretary of Health, as I think he is called, in the United States, at a Press conference announced that poisoned cranberries were on the market. This was only a few weeks before Thanksgiving Day, which was very unfortunate for the housewives of America. He said that cranberries, particularly from the States of Oregon and Washington, had been sprayed with a particular spray which might be very dangerous indeed.

When I checked on this subject I found that a similar spray, containing very similar chemicals, is widely used in this country for spraying mustard, particularly in Norfolk. The last thing I should try to do is to introduce any scare talk into a serious subject like this, and I hope that people will not stop eating mustard, because I believe that there is probably nothing in this suggestion from the point of view of personal health. It was even shown in the United States that the Secretary of Health might possibly have exaggerated the danger from the use of this spray. Nevertheless, it was a scare, and it is the kind of thing which ought to be avoided. It certainly seems to tend in the same direction—to show that more research is necessary.

Next, I should like to mention that the Royal Society for the Protection of Birds, on the Council of which I have sat for more than ten years, is extremely anxious about this problem and has been anxious about it for a number of years. The Parliamentary Secretary will recollect that we have been in correspondence about this and that in the Society we have been trying to assemble all the evidence we can. It is not very easy without field trials, to assemble sufficient evidence, because it is a very

unrewarding business to walk about the undergrowth looking for small birds which have died possibly as a result of picking up contaminated seed.

The British Trust for Ornithology shares the views of the Royal Society for the Protection of Birds. I received a letter two days ago from the British Field Sports Society, the chairman of which is my hon. Friend the Member for Salisbury (Mr. J. Morrison), also expressing anxiety. The Nature Conservancy is very much in favour of more research and of field trials, as we have been told.

My last piece of evidence is the Zuckerman Report itself, to which my hon. Friend made several references. I should like to read from paragraph 82 (xvii) of the Third Report:

"Finally, our enquiries have clearly shown how great are the gaps in our knowledge of the effects which the toxic chemicals used in agriculture may have on wild life, not to mention the possible consequential effects upon successful crop cultivation; and our pilot observations have indicated how well justified further field studies would be. There is a pressing need for more fundamental research."

I feel sure that the Parliamentary Secretary will take very careful note of that paragraph which, I know, he must have studied very carefully as he has studied the whole Report. I cannot but add that I regard it as most regrettable that that particular piece of advice was not taken.

In conclusion, I should like to congratulate my hon. Friend on an admirable, effective and constructive speech on a subject which is undoubtedly of widespread importance. I particularly hope that the Parliamentary Secretary will be able to tell us that the Ministry recognises that this problem which was serious a few years ago is now more serious, and that he agrees with the views expressed by my hon. Friend and myself that there is an urgent and overwhelming case for more research, both short-term and long-term.

Mr. H. Hynd (Accrington):

It is quite possible that these substances are very necessary—or, at least, desirable—for the promotion of agriculture both at home and abroad. That is why I think that the proposed commission of inquiry should not start off with the idea that they need necessarily be completely prohibited. However, sufficient has been said to show that there is a very strong case for setting up such a commission of inquiry, and I have very great pleasure in supporting the request for one.

Mr. John Eden (Bournemouth, West):

I ask the Parliamentary Secretary and his colleagues at the Ministry to treat this as a serious and urgent matter. No one is trying to raise alarm and despondency at all, but there is enough evidence to give cause for concern and to warrant investigation of some of these delayed action poisonous sprays such as DDT—and there are others.

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The organo-phosphorus sprays are even more dangerous, and serious consideration should be given to the need for conducting long-term research into the cumulative effect of these sprays on human, plant and animal life.

I would ask my hon. Friend the Joint Parliamentary Secretary also to give some consideration to those long-term experiments already being conducted, which have produced some extremely revealing results on this and related subjects.

The Joint Parliamentary Secretary to the Ministry of Agriculture, Fisheries and Food (Mr. J. B. Godber): . . .

I am very grateful to my hon. Friend for bringing this subject forward, and I am only sorry that the time available is not sufficient for us to go at all fully into this important matter. I sympathise with hon. Members who have spoken, obviously much more briefly than they otherwise would have done, on the subject, but I shall try to put the matter in perspective.

I agree that we cannot give too much attention to matters that may affect the nation's health and well-being. The use by farmers of toxic chemicals on food crops has given rise to a lot of uneasiness, and the use of these substances should be discussed, not only so that the facts may be examined but in order to keep things in proper focus.

The authorities should not be pressed into action which the facts do not justify, and we must be mindful of the interests of the public at large and also of any section of it. Hon. Members will appreciate that chemical sprays play a most valuable part in agricultural production and in improving the quality of produce marketed. The use of chemicals on the present scale reflects the success of workers in many fields in helping to solve the problems of growers. We all know that that problem is to produce enough food of the right kind and of the right quality, which the consumer demands and is entitled to expect. To say this is not to admit that no curb or restriction is ever to be placed on the scientist or on the merchant, or, indeed, on the grower.

Manufacturers are constantly striving to produce and contractors and farmers to use less toxic chemicals that will do the job. Only this morning, I received some interesting figures to show that one of the largest firms concerned in this business has been seeking progressively over the last few years to get a smaller and smaller percentage of spray work done with these poisonous substances. I find that their main research effort over the past five years has been in finding safe products to replace some of the more poisonous ones. This research has cost up to £½ million a year. Happily, it is meeting with a measure of success. Several poisonous chemicals have been replaced by new products which are perfectly safe and effective as weed killers and insecticides. It is by no means true that all existing products are harmful—

Mr. Eden: For whom are these new products safe?

Mr. Godber: For humans, and animal and bird life.

The percentage of the acreage which one company has sprayed over the last few years with dangerous substances has dropped from over 5 per cent, of the total sprayed to 3½ per cent. The company tells me that it expects to see this reduced again next year and hopes to see the harmful type of insecticide eliminated altogether from its range in a matter of one or two years.

This is to put the matter in perspective, and it is not unimportant that these facts should be brought to the notice of hon. Members. Having said that, I do not deny that there is a problem at present. The Zuckerman Working Party Report on Residues of Toxic Chemicals in Food, issued in 1953, suggested a voluntary scheme whereby manufacturers and distributors would notify proposals for the use of new toxic substances or new uses of existing chemicals. These would be examined and recommendations would be made by an inter-departmental advisory committee. Such a scheme, in which the Government and the agricultural chemical industry are equal partners, was brought into being in 1954 and has been working ever since.

At its heart is the Advisory Committee, which comprises administrators and scientists drawn from the

Health and Agricultural Departments, the Medical and Agricultural Research Councils, the Board of Trade, the Government Chemist's Department and the Nature Conservancy. Its terms of reference cover risks to operators, to consumers, to farm animals and wild life. We have it in mind to augment the Committee still further by appointing eminent independent members in the fields of medicine, agriculture, chemistry and nature conservancy. The main business of the Committee is to consider reports and recommendations from its scientific sub-committee on notifications submitted by the manufacturers.

My hon. Friend the Member for Harborough referred particularly to a very unfortunate incident, and to the use of arsenites. These are used in agriculture mainly for weed killing and primarily, perhaps, for the destruction of potato haulm. They are also used in some sheep and cattle dips. These arsenites should be distinguished from the less toxic lead arsenate which has been used for many years as a spray on fruit trees. The use of arsenites for destroying potato haulms is of comparatively recent origin. As my hon. Friend said, it came into large-scale use when there was a world shortage of sulphuric acid, but let no one think that sulphuric acid is not dangerous unless it is very carefully handled. There is the difficulty with all chemicals that one has to weigh up the relative disadvantages of their use.

As my right hon. Friend recently informed the House in reply to Questions, he has received the recommendations of the Advisory Committee on Poisonous Substances Used in Agriculture and Food Storage, and is discussing them with the industry. The consultations have now reached an advanced stage. This week my right hon. Friend has discussed the matter with representatives of the Association of British Chemical Manufacturers, the Association of British Manufacturers of Agricultural Chemicals, the Association of British Sheep and Cattle Dip Manufacturers, the National Association of Corn and Agricultural Merchants, the National Farmer's Union, the National Association of Agricultural Contractors and the British Chemical Dyestuffs and Traders Association (Importers). So we have been going into this matter in every way possible with the people concerned.

As a result the most urgent consideration is being given to the points raised at the meeting and my right hon. Friend hopes to make a statement soon. The hon. Gentleman the Member for Accrington (Mr. H. Hynd) asked if I could make one now. I am not in a position to do so, but that does not mean that my right hon. Friend is not very much seized of the urgency of this matter. In passing, may I say that, as the use of arsenites is seasonal, the likelihood of use over the next few months is nil, so there is time for the matter to be properly considered.

Mr. Willey: On that point, will the Joint Parliamentary Secretary assure us that there will be full publication of the findings so that the public can feel reassured not only about the position but about the steps the Government are taking?

Mr. Godber: My right hon. Friend will make a full statement on the decision reached and will give the reasons why he has come to those decisions, so there will be ample opportunity for hon. Members to take up the matter. The best thing is to see the statement which my right hon. Friend will make. I have never yet known the hon. Gentleman to be inhibited about asking questions. The recommendations of the Advisory Committee are normally looked on as confidential, so I have some difficulty in going further than that at the moment.

My right hon. Friend has been discussing these matters with his right hon. and noble Friend the Minister of Science and his right hon. and learned Friend the Minister of Health. They are proposing to consider sympathetically whether more research work should be done on the general aspect. They propose, therefore, to arrange for a small group of scientists to review the situation and to make proposals as to whether more research work generally is necessary. I would like to have had more time to answer the debate, but I am glad to be able to give the House this information.

I realise the keen interest taken by hon. Members not only in the aspect of human health but also in that of wild life. Both my hon. and gallant Friend the Member for Lewes (Col. Beamish) and my hon. Friend the Member for Bournemouth, West (Mr. Eden) are particularly interested in the need to safeguard wild life, especially birds, and the proposed review might be valuable in this respect. I hope this information will be of some comfort to my hon. Friend the Member for Harborough.

Our declared aim is to maintain our present efforts to safeguard all interests; to refuse to be rushed into action which could not be justified by experience or logic; to encourage by all means in our power the establishment of an even firmer and broader foundation of our knowledge on these matters, and to continue to do all we can to prevent hazards from the use of toxic chemicals in agriculture.

My hon. Friend the Member for Harborough asked us to set up a Royal Commission. The hon. Member who seconded the Motion made it clear that he was not wholeheartedly behind the suggestion for a Commission. We all know in this House how long it takes for Royal Commissions to report. It is not because we are against careful investigation that I say we should find it difficult to set up a Royal Commission. I hope, however, that what I have said, in the very little time I have had to say it, indicates that we do not take this matter lightly and that we are—

It being Four o'clock, the debate stood adjourned.

NEWS

N.A.A.S. Appoint Senior Scientific Advisory Officer

Dr. N. H. Pizer, M.Sc., Ph.D., F.R.I.C., has been appointed Senior Advisory Officer (Science) in the National Agricultural Advisory Service in succession to Mr. W. Morley Davies, M.A., B.Sc., F.R.I.C., Dip. Agric. (Cantab.), who retired on 31st December, 1959.

Mr. Morley Davies at the same time gave up the secretaryship of the Agricultural Improvement Council for England and Wales, which he had held since 1949; Miss J. B. E. Haydon and Dr. R. E. Taylor, B.Sc., (Agric.), Ph.D., have been appointed joint secretaries.

Dr. Pizer, who is 53, was educated at Latymer Upper School and at Reading and London Universities. Before joining the Ministry he was employed as follows: 1929-31 Soil Surveyor, Reading Province; 1931-34 Assistant to Advisory Chemist, Cambridge; 1934-38 Assistant Chemist, Wye College; 1938-46 Research and Advisory Chemist, Wye College. He was first appointed to the Ministry as a Soil Chemist Grade I on 1st October, 1946, at Cambridge, where he is still serving.

Miss Haydon is a Principal in the Ministry of Agriculture, Fisheries and Food.

Dr. Taylor, a Grade I Advisory Officer in the National Agricultural Advisory Service, was assistant to Mr. Morley Davies.

British Expert to Lecture to the Weed Society of America

Leading authorities from three nations will address members of the Weed Society of America during a general session at their third biennial meeting which will be held on 22-25 February, 1960 at the Cosmopolitan Hotel, Denver, Colorado. Hosts to the meeting will be the Western Weed Control Conference. It is reported that more than 500 scientists and others interested in weed control will attend the four day meeting.

"Weed Control Research—Past, Present, Future" will be the title of an address by W.S.A. President, Dr. A. S. Crafts, Botany Department, University of California, Davis, California, to be given at the opening of the general session Tuesday morning, 23rd February.

Other speakers who will address the General session include: Dr. E. K. Woodford, Department of Agriculture, Oxford University, England, who will speak on "Weed Control Research in England"; Dr. Hans Gysin, Director of Research, Geigy Chemical Corporation, Basle, Switzerland, whose paper will be titled "The Role of Chemical Research in Developing Selective Chemical Weed Control Practices"; and Dr. M. W. Parker, Director, Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture, Beltsville, Maryland, who will discuss "Organizational Needs in the Field of Weed Control".

In addition to the general session, 14 sectional meetings are scheduled for the February meeting. These will be devoted to discussions of various aspects of modern weed control.

S.D.C. Technical Director to tour Persian Gulf

Mr. D. Boocock, Technical Director, Standardised Disinfectants Co. Ltd., will be visiting Malta, Cyprus, Jordan and territories in the Persian Gulf in February, 1960.

During his tour he will be concerned with both the commercial and technical aspects of the company's exports of Livestock Dips, Wood Preservatives, Insecticides for agricultural, medical and industrial pest control.

Wart Disease Immunity Trials and Merit Tests of New Varieties of Potatoes

All breeders and raisers of new varieties of potatoes are invited to take advantage of the arrangements for the Scottish Official Immunity and Merit Trials, 1960. They are open to new introductions raised by breeders in Scotland, England and Wales.

The trials test new varieties of potatoes for immunity from Wart Disease and for commercial value with a view to their being commended as new and improved immune varieties.

Certificates of commendation are issued for new varieties which are found, after test for the period of three to four years, to be immune from Wart Disease and of a grade of excellence at least equal to that of standard varieties. A small fee is payable.

Full particulars may be obtained from the Department of Agriculture for Scotland, Broomhouse Drive, Edinburgh, 11, or from the Ministry of Agriculture, Fisheries and Food, Plant Health Branch, Whitehall Place, London, S.W.1.

In addition to these official trials, facilities are provided by the Department's Scientific Services Station at East Craigs, Corstorphine, Edinburgh, 12, and by the Ministry's Plant Pathology Laboratory at Harpenden, Herts., for preliminary testing of new seedling varieties, raised by breeders in Scotland and in England and Wales respectively, to determine susceptibility to Wart Disease.

Sample tubers should be sent to reach the respective laboratories as soon as possible but not later than 31st December, 1959.

Grass Seeds Mixtures for England and Wales

Farmers will now be thinking of their grass seeds mixtures for next season. Examples of suitable mixtures are given in the Ministry's Advisory Leaflet No. 454, "Herbage Seeds Mixtures," single copies of which are obtainable free of charge from the Ministry of Agriculture, Fisheries and Food (Publications), Soho Square, London, W.1.

The National Agricultural Advisory Service has reviewed the seed supply position in consultation with the National Institute of Agricultural Botany, the Grassland Research Institute, the seed trade and the National Farmers' Union. It is considered that adequate supplies of high quality seeds of British certified bred and other bred varieties are likely to be available for 1960 sowings.

It must be noted that as a precaution against infestation from Lucerne Stem Eelworm, farmers who intend sowing Lucerne are advised to order seed that has been fumigated with Methyl Bromide.

Scarecrow Banishes London Starlings

So successful have been experiments with Scarecrow bird repellent in Trafalgar Square and adjoining public buildings that Lord John Hope, Minister of Works, said in the House of Commons on Tuesday, 8th December, that he proposed to continue with this repellent. The Ministry of Works has been seeking an efficient bird repellent for thirty years.

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In reply to a suggestion from Sir Anthony Hurd (C. Newbury) that he should get the best possible technical advice from America, Lord John said: "This has been so successful that I doubt whether anyone could think of anything better" (*Hansard*, 8th December, 1959, Oral Answers to Questions, p.196).

Scarecrow has four main advantages.

Firstly, it does not harm birds and experiments have been conducted with the co-operation of the R.S.P.C.A. who are satisfied that if applied properly the repellent is harmless. Scarecrow is a lacquer which should be brushed thinly on roosting and nesting surfaces. When the birds alight they feel insecure and go away. As the repellent is thinly applied they cannot pick it up on their wings, and there is no risk of birds being unable to fly away.

Secondly, Scarecrow breaks the birds' roosting habit so that they will not return. Subject to weather conditions and air pollution, Scarecrow will remain active for a long period and has been known to last for a year.

Thirdly, by repelling birds, Scarecrow cuts down heavy maintenance costs on cleaning ledges and parapets which have been fouled by roosting birds, and in clearing gutters and

pipes which have been clogged by nesting birds.

Fourthly, Scarecrow can help to reduce other infestations since insect pests such as carpet beetles, grain beetles, bacon beetles and spider beetles breed in nests, while disease-carrying flies breed in the droppings of birds.

In factories, where birds perching on overhead girders have been a nuisance to workpeople—especially in canteens—Scarecrow has been used to deter the birds, much to the relief of the many hundreds of staff.

Scarecrow is manufactured and supplied by Agricultural and Industrial Coatings Ltd., 144 Camdenn High Street, London, N.W.1.

If the stone is porous it should first be treated with Scarecrow Sealer. The method of application is to work from the top of a building downwards, covering ledges and sills from edge to edge, and brushing on the lacquer in a thin film. One gallon of Scarecrow and Scarecrow Sealer will each cover approximately 60 square yards.

Agricultural and Industrial Coatings Ltd. is a new company which has recently joined the British Ratn Group, Britain's largest pest control organisation.

Pine Looper Moth.

Forestry Commission Leaflet No. 32.
Published by H.M.S.O. Price 1s. 3d.

This publication can be recommended to forestry workers in Britain and Europe. It is attractive, containing a number of coloured and black and white plates, and although it only amounts to 9 pages it contains some very useful information.

The leaflet starts off by stating that:

"The Pine Looper Moth, *Bupalus piniarius* L., is one of the most serious primary pests of pine in central and eastern Europe, Scandinavia and Russia. It is indigenous to Great Britain and is common in most of our pinewoods; but never, until the past few years, has it proved of economic importance here. In 1953, however, over 100 acres of Scots Pine in the Commission's Cannock Chase Forest in Staffordshire were completely defoliated by it.

"It appears that the conditions most suited to serious infestation by this defoliator can arise in the pole and later stages of a plantation's growth. As there are very considerable areas of young pinewoods in this vulnerable stage in various parts of the country, and as, moreover, many consist of pure pine, the Pine Looper is potentially a very dangerous pest. It is the purpose of this

leaflet to enable it to be identified at all its stages of life, and to provide some information regarding its life cycle and forest importance."

The moth is then placed in its systematic position and this is followed by a description of the species at all stages in the life cycle. From this it will be known where and when to look for the various stages and how to identify them.

The importance of this pest is discussed and in this connection is stated:

"Before methods of control were developed, outbreaks in Central Europe used to cause the death of thousands of acres of Scots pine. Its natural host plant is Scots pine (*Pinus sylvestris*), but it has also been found feeding on Corsican pine (*P. nigra* var. *calabrica*), lodgepole pine (*P. contorta*), maritime pine (*P. pinaster*), western yellow pine (*P. ponderosa*), Monterey pine (*P. radiata*), Weymouth Pine (*P. strobus*), Japanese larch (*Larix leptolepis*), European larch (*Larix decidua*), and Douglas fir (*Pseudotsuga taxifolia*). Typically it is of economic importance in areas of low rainfall (20-25 inches) and sandy soil. Most authorities agree too that infestation does not normally occur until the crop has grown into the pole stage, and that attack is most likely in large dense blocks of forest. These are the conditions at Cannock Chase Forest in Staffordshire where the first infestation reported in Great Britain occurred (1953), and also at Culbin and Roseisle (Moray) where abnormally high populations were found the same year. It appears obvious, however, that there must be factors, other than those of soil, rainfall and age class, which have important effects on population density. Local weather conditions, for instance, must have a great deal of influence on the numbers present at any one place, or time, but the exact combination of conditions which are necessary to the development of infestation is incompletely known. It must be concluded, therefore, that the many large blocks of pine in this country which have been planted on sandy soils and enjoy a fairly low rainfall are now certainly approaching, if they have not already reached, a susceptible age, and must be considered liable to attack."

The characters of an infestation are indicated the most serious of which appears to be the fact that

"There is no gradual increase of damage from year to year to give warning of an approaching calamity . . . the wilting of needles and consequent discolouration caused by the feeding of the larval is first noticeable only when this population has reached infestation proportions."

In view of the sudden character of *Bupalus* outbreaks it is desirable to have some means of assessing the status of this insect in any particular area and consequently there is an account of accurate method which can be carried out fairly easily.

Central methods are discussed from which it appears "that control by natural means may be only expected after 3 or 4 years of infestation whereas a Scots pine is most unlikely to stand more than 2 years' defoliation. Some means of artificial control must be employed therefore at the latest after the first year of damage."

Cartridge Rebate Scheme to end

In a written answer to a Question in the House of Commons by Mr. Simon Wingfield Digby, T.D., M.P., about whether the rebate on cartridges for the organised shooting of harmful birds is to be continued, the Minister of Agriculture, Fisheries and Food, the Rt. Hon. John Hare, M.P., said

"This subsidy is open to abuse. The Secretary of State for Scotland and I do not consider that we should be justified in continuing it after the end of March. Nevertheless, we hope that shooting will continue to be used as a control measure, and we are discussing with the agricultural interests concerned the possibility of extending the scope of grants to Rabbit Clearance Societies to include expenses incurred in shooting certain harmful birds, such as wood-pigeons."

Foot and Mouth Disease, Fowl Pest and Swine Fever connected with Uncooked Waste Food

Arising out of investigations into the origin of recent outbreaks of foot-and-mouth disease, fowl pest and swine fever, there is circumstantial evidence that primary cases have arisen through animals eating uncooked waste food.

Stock owners and poultry-keepers are warned that scrupulous attention must be paid to the rule that no person may feed unboiled waste food to animals or poultry or allow them to have access to it.

Foot-and-Mouth Disease

Foot-and-mouth disease was confirmed on 28th December among cattle at Hormead, Buntingford, Herts.

An area extending for approximately 10 miles around the infected premises has been declared to be an Infected Area.

Animals may not be moved in the Area without a licence and the holding of markets in the Area is restricted.

Withdrawal of Foot and Mouth Restrictions

Restrictions on the movement and marketing of livestock in the Infected Areas around Cardiff and around Westhoughton, Nr. Bolton, Lancashire, have been withdrawn as from 27th December; restrictions around Hallaton, Market Harborough, Leicestershire, and around Barnstone, Nr. Nottingham and around Heaton Norris, Stockport, Cheshire, have been withdrawn as from 29th December.

The outbreaks in these five areas involved the slaughter of the following livestock:—

AREA	Out-break	Cattle	Sheep	Pigs	Goats
Roath, Cardiff	2	117	571	169	—
Westhoughton, Nr. Bolton	1	24	21	153	—
Hallaton, Mkt. Harborough	3	130	38	65	—
Barnstone, Nr. Nottingham	2	74	29	126	—
Heaton Norris, Stockport	1	41	—	339	1

Use of Approved Chemical Agents for the Cleansing of Dairy Equipment

Approval has been given by the Minister of Agriculture, Fisheries and Food and the Minister of Health under the Milk and Dairies (General) Regulations 1959, for the use of the undermentioned products as chemical agents in the cleansing of dairy equipment:—

Name of Product	Name of Firm
"Sterilex"	The British Hydrological Corpn., Colloidal Works, High Path, London, S.W.19.
Hypochlorite	
Name of Product	Name of Firm
Lactosan "66" (Mark III)	Gascoyne Crowther Ltd., Lactosan Laboratories, Caversham, Reading.